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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of:	]
JEAN-LUC HOFFMANN et al	]MAIL STOP APPEAL BRIEF-]PATENTS
	]
Serial No: 09/582,625	]
	]Group Art Unit: 1725
	]
Filed: August 8, 2000	]Examiner: L. Tran
	]
For: ALUMINUM ALLOY STRIPS WITH HIGH SURFACE HOMOGENEITY AND METHOD FOR MAKING SAME	]Attorney Docket: 00130

Appeal No:__________

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF APPELLANTS' BRIEF ON APPEAL

Submitted herewith are three copies of Appellants' Brief on Appeal in the above-identified application, together with the required fee, paid by credit card (Form PTO-2038).

Respectfully submitted,

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Honorable Commissioner for Patents
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APPELLANTS' BRIEF ON APPEAL

I. REAL PARTY IN INTEREST

The real party in interest is the assignee, Pechiney Rhenalu, and parent company Pechiney (ALCAN Group).

II. RELATED APPEALS AND INTERFERENCES

A concurrent appeal has been filed in divisional application 10/013,681.

III. STATUS OF CLAIMS

Claims 21-51 are on appeal. Claims 1-20 have been canceled.

IV. STATUS OF AMENDMENTS

No response was filed to the Final Rejection mailed June 23, 2003; there are no unentered amendments.

V. SUMMARY OF INVENTION

The invention is directed to aluminum alloy strip with

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high surface homogeneity which can be used as reflectors produced by twin-roll casting (page 1, lines 2-8). In the twin roll casting method, liquid metal, stored in a supply tank, is introduced in the gap between two cooled horizontal rolls rotating in opposite directions, using an injector. The metal is solidified in the form of a continuous strip, while being reduced in thickness due to the roll pressure. These continuous casting machines are very often used to produce strips between 5 and 12 mm in thickness (paragraph bridging pages 1 and 2). Further, the liquid metal solidies at its center upstream of the axes of the rolls (page 4, lines 8-9).

While it is possible to use the strip obtained as cast, surface treatments of the strip in demanding applications are liable to reveal or create surface defects from metallurgical heterogeneities. The upper side of the strip may contain ripples which appear to be caused by oscillation of the meniscus of the liquid metal during casting. After anodic treatment, these ripples become parallel streaks (page 2, lines 11-20).

Another common surface defect is parallel mechanical scratches along the strip, which is a roughness defect. Accidental scratching of the strip may also occur (page 3, lines 1-7).

Appellants have discovered that the surface quality of the strip produced by twin roll casting may be improved by recessing the upper lip of the injector by at least 2 mm, and preferably by at least 5mm, with respect to the lower lip (page 7, lines 11-19).

The level of liquid metal in the casting tank should be kept below 30 mm (page 7, lines 20-22).

The invention makes it possible to obtain strip in which

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the surface may be characterized as follows:

The aluminum alloy strip produced has an upper side showing after a 1 μm thick sulphur anodic treatment, an optical roughness value S_N measured on three 5 cm longitudinal sections and three 5 cm transverse sections, such that its mean variation on each section, defined by the ratio:

(maximum S_N - minimum S_N)/mean S_N is less than 20%, and the difference $\Delta S_N = S_N$ max - S_N min is less than 20 (page 6, lines 3-13).

The cast and cold rolled strip shows, on its upper side after an acid pickling treatment on a 10 μm thickness, followed by a 1 μm thick sulphur anodic treatment, an optical roughness value S_N, measured on three 5 cm longitudinal sections and three 5 cm transverse sections, such that its variation is less than 20% and the difference ΔS_N is less than 12 (page 6, lines 14-22).

The cast strip has an upper side showing, after pickling and sulphur anodic treatment, at least one of the characteristics:

(a) an Sk value determined by 3D roughness measurement greater than -2.0; and

(b) an Ek value determined by 3D roughness measurement less than 15 (page 23, lines 16-24).

The cold rolled and finished strip shows on its upper side, after electrolytic brightening followed by a 1 μm thick sulphur anodic treatment, an optical roughness value S_N measured on three 5 cm longitudinal sections and three 5 cm transverse sections, such that its variation is less than 20% and the difference ΔS_N is less than 3.5 (page 6, lines 23-30).

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The strip has after pickling and sulphur anodic treatment, an Sk value, obtained by 2D roughness measurement analysis of images obtained with an optical scanner, between -0.2 and +0.3 (page 7, lines 1-10).

The strip has, after cold-rolling to a thickness between 4 and 0.1 mm, and having undergone at least one finishing pass with polished cylinders, with a roughness Ra < 0.2 um, an upper side which, after electrolytic brightening followed by a 1 µm thick sulphur anodic treatment, has an optical roughness value S_N measured on three 5 cm longitudinal sections and three 5 cm transverse sections, with a variation which is less than 20%, and the difference ΔS_N which is less than 3.5 (page 6, lines 23-30).

VI. ISSUES

The issues on appeal are:

1) whether claims 21-25, 27-34, 36-40, 42-45 and 47-50 are obvious under 35 USC 103(a) over US 5,350,010 to Sawada et al in view of DT 23 43 068 A1 (DT '068); and

2) whether claims 26, 35, 41, 46 and 51 are obvious under 35 USC 103(a) over US 5,998,044 to Limbach et al in view of DT 23 43 068 A1.

VII. GROUPING OF CLAIMS

All claims falling under each rejection are to be considered as a single group.

VIII. ARGUMENTS

It is noted initially that each of the independent claims is directed to aluminum alloy strip in which a surface of the strip is characterized by a particular method. These characterization methods are, in themselves, well known. The claimed invention lies in the values which are obtained,

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values which are indicative of a very high degree of surface homogeneity.

Sawada et al is directed to a method for producing a planographic printing plate support and specifically an aluminum support having an excellent electrolytic roughness. It is well known that planographic printing plates must exhibit a well controlled surface roughness known as a satin-type finish. If the roughness is too low, and the plate has a mirror-type finish, printing ink will not adhere to the surface of the plate. The object of Sawada et al is to produce a planographic printing plate excellent both in the aptitude to roughening and in external appearance, as disclosed at column 2, lines 56-58. At column 1, lines 14-17, Sawada et al state that it is generally necessary that the aluminum plate have a moderate adhesive property to a photosensitive material and a moderate water retentivity.

Accordingly, the goal of Sawada et al is completely different from the goal of the claimed invention, which is to obtain a surface having a very high degree of homogeneity, i.e. a mirror-type finish. The finish of the claimed invention would by totally unsuitable for the purposes of Sawada et al.

The casting process shown in Figure 5 of Sawada et al is a twin roll casting process, the process which makes possible the strip of the invention. However, since Sawada et al requires a strip with a roughened surface, Appellants submit that Sawada et al do not disclose or suggest obtaining a strip with a mirror-like surface, and that any modification which resulted in a mirror-like surface would be as inconsistent with the teachings of Sawada et al.

The Final Rejection alleges that Sawada et al should be

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combined with DT '068, for the purpose of preventing surface segregation. The presumed result of such a combination would be, according to the Final Rejection, recessing the upper lip of the injector with respect to the lower lip in the twin roll casting process, and this would arrive at the claimed invention, strip with high surface homogeneity.

However, it can be stated initially that DT '068, is not directed to twin roll casting, but to belt casting.

In belt casting, liquid metal is not cast directly in the gap between the rolls, but cast between two belts which are driven by rolls, and which form the upper and lower surfaces of a mold. Moreover, shown in the figures of DT '068, the center of the strip solidifies downstream of the axes of the driving rolls. In twin-roll casting, the solidification of the center of the strip must take place upstream of the axes, because, in the absence of the belts, such liquid metal downstream of the axes would run down the lower roll.

Belt casting is not widely used because it does not provide high surface homogeneity, largely due to oscillations of the belts.

Given the differences between belt casting and twin-roll casting, and the poorer surface quality obtained, Applellants submit that one of ordinary skill in the art of twin-roll casting would not look to belt casting to improve twin roll casting.

The teaching of DT '068 that is relied upon in the Final Rejection is that at least one lip of the injector should be recessed. However, if one refers to the drawing figures of DT '068, it is only in Figure 2 that the upper lip is recessed with respect to the lower lip. In Figure 3, both lips are equally recessed. The object, as can be seen from

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the abstract, is that "the bath of metal is pref. in contact with the ingot mould along an arc corresponding to an angle of 1-15 degrees, esp. 5-10 degrees, at least upstream of the upper driving roll."

Thus, according to DT '068, the bath should be in contact with the mold upstream of one or both rolls. This is not a teaching which has relevance to twin roll casting, because in twin roll casting, liquid metal *must be in contact with both rolls upstream of the rolls*.

This principle can be seen in Figure 1 of the present application. As shown in Figure 1, both lips of the injector are upstream of the axis of the rolls, for the reason discussed in the first paragraph on page 4 of the specification: the strip must solidify at its center upstream of the axis of the rolls. As noted, this prevents unsolidfied metal from running out from the lower roll, which is not an issue with belt casting, in which the belts confine the liquid metal.

Thus, DT '068 teaches one of ordinary skill in the art to do in belt casting what is already known in twin roll casting: place the lips of the injector upstream of the axis of the rolls.

Further, as regards the prevention of surface segregation in DT '068, Appellants submit that it the "head" of molten metal that prevents surface segregation, at least on one side of the sheet. This "head" is presumably the result of moving the lip of the injector upstream of the axis of the rolls, and is not the result of recessing one lip with respect to the other. Since both lips are already upstream of the axis in twin roll casting, whatever advantage exists (according to DT '068) by having a head of molten metal is already there, and one need not further follow the teaching

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of DT '068 to prevent surface segregation.

In fact, Appellants have discovered that in the process of twin roll casting, where the lips of the injector are already disposed upstream of the axis of the rolls, the surface quality can be improved by recessing the upper lip with respect to the lower lip.

Thus, what DT '068 teaches one of ordinary skill in the art is that in belt casting, one or both lips of the injector should be placed upstream of the axis of the rolls. In twin roll casing, both injector lips are already upstream of the axis of the rolls, so there is no reason to apply the teachings of DT '068 to Sawada et al, and even more so if one were to discover that the result of such a combination would be inconsistent with the purpose of Sawada et al.

Limbach et al teaches the production of an aluminum sheet *suitable as a lithographic plate* by rolling to obtain a thickness of 4 to 0.1 µm. The sheet, however, is described as being roughened or grained (col. 1, lines 20-21) and uniformly rough by virtue of a rippled topography (col. 2, lines 13-14), and is therefore quite different than the strip which is presently claimed, a strip with a mirror-type finish resulting from its homogeneity. Moreover, superimposed on this ripple topography of Limbach et al is a pitted structure with pits having an average diameter of 1-20 microns (col. 3, lines 19-21).

Accordingly, Limbach et al does not disclose or suggest an aluminum alloy sheet with high surface homogeneity, and any such sheet as is presently claimed would be inconsistent with the purposes of Limbach et al.

Limbach et al teach an R_a value of 0.4 microns, as opposed to 0.2 microns, as is presently claimed. The Final Rejection alleges that an R_a value of 0.2 microns would have

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been an obvious optimization of ranges requiring only routine skill in the art; *In re Aller*, 105 USPQ 233 (CCPA 1955).

Appellants submit that this is not a proper application of the obviousness of optimizing ranges. The *Aller* case deals with optimization of a process parameter; what Appellants have done is not to optimize a process parameter, but rather to optimize a property of the final product. There is no teaching in Limbach et al of how to optimize that property by reducing R_a, and moreover, no motivation in Limbach et al to reduce R_a, since Limbach et al prefers a rough surface, not a smooth surface.

Once again, DT '068 has been combined with a primary reference, in this case Limbach et al. However, the sheet produced by Limbach et al is not produced either by twin roll casting or by belt casting, or by any continuous casting method at all; conventional casting which is used according to Limbach et al produces a sheet with a totally different microstructure. Thus, there is no reason why one of ordinary skill in the art would utilize the teachings of DT '068 at all, when considering the Limbach et al reference.

Accordingly, Limbach et al does not teach obtaining a sheet by twin roll casting and does not teach obtaining a sheet with high surface homogeneity, and there is no disclosure or suggestion which would lead one of ordinary skill in the art to utilize the teachings of DT '068 in the totally different casting method of Limbach et al.

Reversal of the rejections of record is respectfully requested.

Respectfully submitted

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IX. APPENDIX

The claims on appeal are:

21. Aluminum alloy strip with high surface homogeneity produced by twin-roll casting, said strip comprising an upper side having, after a 1 µm thick sulphur anodic treatment, an optical roughness value S_N measured on three 5 cm longitudinal sections and three 5 cm transverse sections, such that there is mean variation on each section, defined by the ratio:

(Maximum S_N - minimum S_N)/Mean S_N

which is less than 20%, and a difference $\Delta S_N = S_N$ max - S_N min which is less than 20.

22. Aluminum alloy strip with high surface homogeneity produced by twin-roll casting and then cold-rolled to a thickness between 4 and 0.1 mm, said strip comprising an upper side having, after an acid pickling treatment on a 10 µm thickness, followed by a 1 µm thick sulphur anodic treatment, an optical roughness value S_N measured on three 5 cm longitudinal sections and three 5 cm transverse sections, such that there is a variation of less than 20% and a difference ΔS_N of less than 12.

23. Aluminum alloy strip with high surface homogeneity produced by twin-roll casting, said strip comprising an upper side having, after pickling and sulphur anodic treatment, at least one characteristic selected from the group consisting of:

(a) an Sk value determined by 3D roughness measurement greater than -2.0; and

(b) an Ek value determined by 3D roughness measurement less than 15.

24. Strip according to claim 23, wherein a value L* determined according to ASTM D2244-89, section 6.2,

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calculated on the basis of 20 individual measurements along a generatrix parallel to a longitudinal direction has a standard deviation which is less than 0.5.

25. Aluminum alloy strip with high surface homogeneity produced by twin-roll casting, comprising an upper side having, after pickling and sulphur anodic treatment, an Sk value, obtained by 2D roughness measurement analysis of images obtained with an optical scanner, between -0.2 and +0.3.

26. Aluminum alloy strip with high surface homogeneity produced by twin-roll casting and then cold-rolled to a thickness between 4 and 0.1 mm, having undergone at least one finishing pass with polished cylinders, with a roughness Ra < 0.2 um, said strip comprising an upper side, after electrolytic brightening followed by a 1 µm thick sulphur anodic treatment, having an optical roughness value S_N measured on three 5 cm longitudinal sections and three 5 cm transverse sections, with a variation which is less than 20%, and the difference ΔS_N which is less than 3.5.

27. Strip according to claim 21, having, on the upper side, a grain size, measured by image analysis, less than 20 µm.

28. Strip according to claim 21, wherein the aluminum alloy is a 1000 series or 8000 series alloy containing between 0.01 and 2% by weight of iron and between 0.01 and 2% by weight of silicon, and iron present in solid solution is greater than 50 ppm + 0.03 x ppm total Fe.

29. Strip according to claim 21, wherein the aluminum alloy is a 5000 series alloy containing less than 1.5% of Mg.

30. Strip according to claim 22, wherein the thickness is between 2 and 0.1 mm.

31. Strip according to claim 23, wherein Sk is greater

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than -1.0.

32. Strip according to claim 23, wherein Ek is less than 8.

33. Strip according to claim 24, wherein the standard deviation is less than 0.3.

34. Strip according to claim 25, wherein the Sk value is between -0.1 and +0.2.

35. Strip according to claim 26, wherein the thickness is between 2 and 0.1 mm.

36. Strip according to claim 27, wherein the grain size is less than 15 µm.

37. An optical reflector comprising an aluminum alloy strip according to claim 21.

38. An optical reflector comprising an aluminum alloy strip according to claim 22.

39. An optical reflector comprising an aluminum alloy strip according to claim 23.

40. An optical reflector comprising an aluminum alloy strip according to claim 25.

41. An optical reflector comprising an aluminum alloy strip according to claim 26.

42. An anodized and optionally lacquered construction plate comprising an aluminum alloy strip according to claim 21.

43. An anodized and optionally lacquered construction plate comprising an aluminum alloy strip according to claim 22.

44. An anodized and optionally lacquered construction plate comprising an aluminum alloy strip according to claim 23.

45. An anodized and optionally lacquered construction plate comprising an aluminum alloy strip according to claim

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25.

46. An anodized and optionally lacquered construction plate comprising an aluminum alloy strip according to claim 26.

47. A drawn part comprising an aluminum alloy strip according to claim 21.

48. A drawn part comprising an aluminum alloy strip according to claim 22.

49. A drawn part comprising an aluminum alloy strip according to claim 23.

50. A drawn part comprising an aluminum alloy strip according to claim 25.

51. A drawn part comprising an aluminum alloy strip according to claim 26.

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